REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

AD-A275 286

2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
1993	Interim 92/01/01 - 92/12/31

4. TITLE AND SUBTITLE

Distributional records for Aedes mosquitoes from the U.S. Air Force ovitrapping program - 1992

5. FUNDING NUMBERS

6. AUTHOR(S)

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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION REPORT NUMBER

AL-JA-1993-0002

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Armstrong Laboratory
Occupational and Environmental Health Directorate
Brooks Air Force BAse, TX 78235-5114

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

To be published in the Journal of the American Mosquito Control Association

12a. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT (*Maximum 200 words*)

During 1992, ovitrapping to sample container-breeding Aedes was conducted at 28 U.S. Air Force installations in North America. Aedes albopictus was collected at 19 installations. The collection of Ae. albopictus at Goodfellow Air Force base (AFB), TX and Moody AFB, GA, represent new records for Tom Green and Lowndes counties, respectively. Six installations were positive for Ae. aegypti; 13 were positive for Ae. triseriatus.

14. SUBJECT TERMS

ovitrapping oviposition mosquito Aedes aegypti Aedes albopictus Aedes triseriatus distribution

15. NUMBER OF PAGES
4

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

Journal of the American Mosquito Control Association, 9(3):352–355, 1993

DISTRIBUTIONAL RECORDS FOR *AEDES* MOSQUITOES FROM THE U.S. AIR FORCE OVITRAPPING PROGRAM—1992

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ABSTRACT. During 1992, ovitrapping to sample populations of container-breeding *Aedes* was conducted at 28 U.S. Air Force installations in North America. *Aedes albopictus* was collected at 19 installations. The collections of *Ae. albopictus* at Goodfellow Air Force base (AFB), TX, and Moody AFB, GA, represent new records for Tom Green and Lowndes counties, respectively. Six installations were positive for *Ae. aegypti*; 13 were positive for *Aedes triseriatus*.

U.S. Air Force (USAF) regulations mandate the use of oviposition traps to monitor container-breeding *Aedes* at installations in the known, or potential, range of the Asian tiger mosquito, *Aedes albopictus* (Skuse). This sampling was dictated by concern about the potential for transmission of dengue or yellow fever viruses should these exotic viruses be introduced into the USA. Additionally, the recent isolation of eastern equine encephalitis virus from *Ae. albopictus* in Florida (Mitchell et al. 1992) emphasizes the possibility that this mosquito may serve as a vector of viruses already enzootic in this country.

During 1992, 28 USAF installations submitted a total of 1,608 ovipaddles to the Occupational Medicine Division, Brooks AFB for processing (Table 1). Eggs on ovipaddles were tentatively identified as *Aedes triseriatus* (Say) or *Aedes* (*Stegomyia*) sp. based on their color and surface texture (Linley 1989a, 1989b) and held for a few days at high humidity to ensure embryonation. The eggs were then allowed to dry and were subsequently hatched in a 1:1 mixture of tap and distilled water. Larvae were fed liver powder and reared to the 4th instar or adult stage for specific identification. Records of previous years' collections at USAF installations have been reported by McHugh and Vande Berg (1989), McHugh and Hanny (1990), McHugh (1991) and McHugh (1992).

Nineteen installations submitted ovipaddles positive for *Ae. albopictus* (Table 1). At these bases, the prevalence was 30.7% (401/1,308). If the 139 *Aedes* (*Stegomyia*)-positive ovipaddles from these 19 bases are assumed to be *Ae. albopictus*, the prevalence at positive bases would be 41.3% (540/1,308).

The collection of *Ae. albopictus* at Moody AFB, GA, on August 31, is believed to be a first record for Lowndes County. Additional *Ae. albopictus*- and (*Stegomyia*)-positive ovipaddles were collected through September 30 when sampling stopped. *Aedes albopictus* is widespread in nearby northern Florida (O'Meara et al. 1992), and was subsequently collected in October in suburban Valdosta, GA, about 7 km south of Moody AFB (M. L. Womack, unpublished data).

The collection of *Ae. albopictus* at Goodfellow AFB, TX, on July 8 is the first record of this species in Tom Green County. An ovipaddle with eggs tentatively identified as *Aedes* (*Stegomyia*) sp. was collected on June 30, but specimens could not be reared for specific identification. Additional *Ae. albopictus*- and (*Stegomyia*)-positive ovipaddles were collected through August 27. Sampling at Goodfellow AFB ended September 23. Because there has been only limited sampling at Goodfellow in the previous 4 years (5 ovipaddles, all negative, submitted during 1989), it cannot be determined when the species was introduced into this area.

The trend at Tinker AFB, OK, is perhaps typical of installations that *Ae. albopictus* has recently colonized. The Asian tiger mosquito was first collected at that base in 1990 when 4.4% of ovipaddles were positive (McHugh 1991). This prevalence increased to 25.6 and 45.8% in 1991 (McHugh 1992) and 1992, respectively. If *Aedes* (*Stegomyia*)-positive ovipaddles are included (*Aedes aegypti* (Linn.) has not been collected at Tinker AFB), these figures become 8.8, 32.6 and 54.1%.

Aedes aegypti was collected at 6 installations. This species has been present in low numbers (<7%) at Seymour Johnson AFB, NC, for 3 of the previous 4 years in the absence of *Ae. albopictus*. Sampling at Shaw AFB, SC, has detected *Ae. aegypti* sporadically, including 1991 when *Ae. albopictus* was first collected at that base and again in 1992. Three bases in San Antonio, TX—Brooks AFB, Lackland AFB, and Kelly AFB—recorded the presence of *Ae. aegypti*, but

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Table 1. Summary of ovipaddles processed at the Occupational and Environmental Health Directorate, Armstrong Laboratory, Brooks Air Force Base, TX, during 1992.

Installation[1] and state	County (Parish in LA)	Total ovipaddles	Positive ovitraps							
			Ae. albopictus		*Ae. aegypti*		*Ae. (Stegomyia)*		*Ae. triseriatus*	
			n	%	*n*	%	*n*	%	*n*	%
Gunter AFB, AL	Montgomery	8	5	62.5	0	0.0	2	25.0	0	0.0
Maxwell AFB, AL	Montgomery	19	11	57.9	0	0.0	1	5.3	6	31.6
Little Rock AFB, AR	Pulaski	164	47	28.7	0	0.0	15	9.1	15	9.1
Bolling AFB, DC	—	40	0	0.0	0	0.0	0	0.0	4	10.0
Avon Park AFR, FL	Polk	59	5	8.5	0	0.0	4	6.8	0	0.0
MacDill AFB, FL	Hillsborough	40	6	15.0	0	0.0	1	2.5	0	0.0
Tyndall AFB, FL	Bay	20	1	5.0	0	0.0	0	0.0	0	0.0
Moody AFB, GA	Lowndes	UNK[2]	P	—	N	—	P	—	N	—
Barksdale AFB, LA	Bossier	57	24	42.1	0	0.0	5	8.8	4	7.0
Columbus AFB, MS	Lowndes	85	32	37.6	0	0.0	14	16.5	31	36.5
Keesler AFB, MS	Harrison	10	9	90.0	0	0.0	1	10.0	0	0.0
Pope AFB, NC	Cumberland	22	0	0.0	0	0.0	0	0.0	1	4.5
Seymour Johnson AFB, NC	Wayne	142	0	0.0	5	3.5	4	2.8	1	0.7
Tinker AFB, OK	Oklahoma	24	11	45.8	0	0.0	2	8.3	0	0.0
Charleston AFB, SC	Berkeley	58	3	5.2	0	0.0	0	0.0	1	1.7
Shaw AFB, SC	Sumter	UNK[2]	P	—	P	—	P	—	P	—
Arnold AFS, TN	Coffee	55	25	45.5	0	0.0	4	7.3	29	52.7
Brooks AFB, TX	Bexar	130	66	50.8	1	0.8	15	11.5	1	0.8
Dyess AFB, TX	Taylor	3	0	0.0	0	0.0	1	33.3	0	0.0
Goodfellow AFB, TX	Tom Green	111	4	3.6	1	0.9	6	5.4	0	0.0
Kelly AFB, TX	Bexar	79	26	32.9	1	1.3	4	5.1	1	1.3
Lackland AFB, TX	Bexar	225	76	33.8	2	0.9	51	22.7	8	3.6
Randolph AFB, TX	Bexar	164	50	30.5	0	0.0	14	8.5	0	0.0
Total		1,608[3]	401	24.9	10	0.6	144	8.9	102	6.3

[1] Installation abbreviations: Air Force Base, AFB; Air Force Station, AFS; Space Center, SC.
[2] The total number of ovitraps used was unknown (UNK). The installation was positive (P) or negative (N) for the species indicated.
[3] Includes ovipaddles submitted by the following installations, all of which were negative: Homestead AFB, FL—31; Kennedy SC, FL—13; Grissom AFB, IN—26; Holloman AFB, NM—20; Altus AFB, OK—3.

Table 2. Trends in abundance and distribution of *Ae. albopictus* and *Ae. aegypti* from the U.S. Air Force ovitrapping program from 1988 through 1992.

	Ae. albopictus					*Ae. aegypti*				
	1988	1989	1990	1991	1992	1988	1989	1990	1991	1992
No. organizations positive	10	11	12	16	19	12	10	4	9	6
% organizations positive	27	29	32	43	68	32	26	11	24	21
No. ovipaddles positive	56	239	118	449	401	91	149	11	24	10
% ovipaddles positive	2.7	8.3	6.0	21.5	24.9	4.4	5.2	0.6	1.1	0.6

the abundance of this species has declined dramatically since the establishment of *Ae. albopictus* (McHugh 1991). The single *Ae. aegypti*-positive ovipaddle collected August 19 at Goodfellow AFB, TX, is noteworthy because this base is near the edge of, or just outside, the extreme northwestern range for this species (Darsie and Ward 1981). The few published collection records for the city of San Angelo and Tom Green County (Tinker and Hayes 1959, Morlan and Tinker 1965) indicate that *Ae. aegypti* previously was absent from this area. As was the case with *Ae. albopictus* collected at Goodfellow AFB, the paucity of collections during previous years makes it impossible to determine when or how often *Ae. aegypti* was introduced into the area.

No specimens could be reared from 144 ovipaddles that held eggs tentatively identified as *Aedes* (*Stegomyia*) sp. Most of these eggs had either dried and collapsed or hatched prior to their arrival at Brooks AFB. In previous years, *Aedes* species other than *Ae. triseriatus*, *Ae. albopictus*, and *Ae. aegypti* have been relatively rare; *Aedes epactius* Dyar and Knab was reared from 6 ovipaddles collected from 1988 through 1990 and was absent in 1991 and 1992 rearings. No *Aedes atropalpus* (Coquillett) was reared during 1992. Thus the vast majority of *Aedes* (*Stegomyia*)-positive ovipaddles in the 1992 collections probably were *Ae. albopictus* or *Ae. aegypti*.

Several studies (e.g., Hobbs et al. 1991) have documented a decline in the abundance of *Ae. aegypti* subsequent to the introduction of *Ae. albopictus*. In general, data from the USAF ovitrapping program support this trend. During the years 1988–92, the number of installations positive for *Ae. albopictus* has doubled and the percent of *Ae. albopictus*-positive ovipaddles has increased almost 10-fold (Table 2). During the same period, the distribution and abundance of *Ae. aegypti* have declined markedly. However, *Ae. aegypti* has not been extirpated, even in areas with a high prevalence of *Ae. albopictus*. In Bexar County, TX, for example, *Ae. albopictus* is common, with 30–50%+ of ovipaddles positive for this species during the past few years. *Aedes aegypti* persists in this area, albeit at low levels. Even in the absence of *Ae. albopictus*, the abundance of *Ae. aegypti* at Seymour Johnson AFB, NC, has declined erratically, with 6.4, 1.7, 0.0, 1.3 and 3.5% positive ovipaddles during 1988–92, respectively. Similarly, Hobbs et al. (1991) reported a marked decline in the abundance of *Ae. aegypti* over several decades prior to the arrival of *Ae. albopictus*. Thus the relative importance of *Ae. albopictus* and other, unrecognized factors in the decline of *Ae. aegypti* remain to be determined.

Thirteen bases submitted ovipaddles positive for *Ae. triseriatus*. No *Aedes hendersoni* Cockerell were reared during 1992.

Forty-six of the ovipaddles were positive for more than one species of *Aedes*. Forty-four were positive for both *Ae. albopictus* and *Ae. triseriatus*. These ovipaddles were submitted by Columbus AFB, MS (16 ovipaddles), Arnold AFS, TN (15), Little Rock AFB, AR (5), Maxwell AFB, AL (3) and Barksdale AFB, LA (2). One ovipaddle collected at Lackland AFB, TX, was positive for both *Ae. albopictus* and *Ae. aegypti*. One ovipaddle collected August 27 at Kelly AFB, TX, was positive for *Ae. albopictus*, *Ae. aegypti* and *Ae. triseriatus*.

D. E. Bowles and M. L. Womack reviewed the manuscript.

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